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Technical News Bulletin No. 72

April 7, 1923.

GENERAL NOTE

Owing to the current nature of the investigations mentioned in the Technical News Bulletin, sometimes it will be impossible to supply printed information regarding them. However, in these cases, when the investigation has progressed sufficiently far, the Bureau will be pleased to furnish technical data to those engaged in the particular application of the subject, in order to avoid the delay incident to publication.

I The Work of the National Physical Laboratory

At a meeting held on April 2, the members of the staff of the Bureau of Standards had the pleasure of listening to a talk by Dr. Walter Rosenhain, Chief of the Department of Metallurgy of the National Physical Laboratory of England. This institution corresponds in many of its functions to the Bureau of Standards in the United States.

Doctor Rosenhain outlined briefly the general work of the N. P. L. and then described more fully the work of his own department. His description of the special microscope which he has constructed for studying the structure of metals proved of great interest as the instrument is unlike that ordinarily employed in this country. He also touched upon some of the principal features of a carbon resistance furnace and a special type of gas-heated furnace which are used in the metallurgical and other work.

The first-mentioned type of furnace is built up of carbon rings so arranged that by varying the contact pressure, the resistance and, consequently, the temperature developed at any point along the length of the

furnace can be regulated. The gas-fired furnace has proved to be very satisfactory for use where a temperature of from 1600 to 1700°C is required, and it can be left in operation for long periods without attention. He also showed a picture and briefly described the experimental rolling mill which was probably the first machine of this kind to be installed anywhere.

The last part of Doctor Rosenhain's talk was devoted to equilibrium diagrams for various alloys, a subject which is receiving a great deal of attention at the National Physical Laboratory.

2 Wave-Length Measurements in the Arc Spectra of Gadolinium and Dysprosium

Compounds of the rare earth elements which are used extensively in the manufacture of gas light mantles and cored carbons for electric arcs, and less extensively in the textile and glass industries for their coloring properties, are about the most difficult salts for the chemist to prepare in a pure state. The chemistry laboratory of the University of Illinois has succeeded in preparing some of the members of the rare earth family in a high degree of purity and has submitted to the Bureau of Standards samples of these materials for spectroscopic analysis. The work on the original assignment of materials is now completed and Scientific Paper No. 466 has just been issued describing the results that have been obtained for the two elements, gadolinium and dysprosium. Two preceding papers have dealt with yttrium, lanthanum, and cerium, and with neodymium and samarium. The spectroscopic analysis confirms the degree of purity attained by the chemists in separating the gadolinium and dysprosium salts from the original materials and in addition yields an accurate description of the green, yellow, red, and infrared spectral regions of these elements which have only been covered incompletely heretofore.

The data collected from the observations are compiled in two tables, one of which contains about 950 wave lengths in the arc spectrum of gadolinium, and the other, about 800 wave lengths in the arc spectrum of dysprosium. These data are of value chiefly to chemists who are interested in problems of analysis, to astronomers who are concerned with the chemical composition of the stars, and to physicists in connection with atomic structure.

This paper can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5¢ a copy.

3 Further Tests of Stellar Radiometers and Some Measurements of Planetary Radiation

Reference has been made in previous numbers of the Bulletin to the investigations which the Bureau of Standards has been conducting for a number of years on the properties of matter, for the purpose of improving the instruments and methods used in measuring thermal radiation. This has

led to production of instruments of sufficient sensitivity to measure the heat of stars and planets. The results obtained have opened to astronomers a new field of investigation on the variability of stars, etc.

In Scientific Paper No. 460, obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10¢ a copy, improvements are described in the thermocouples used for measuring the heat from celestial objects and preliminary measurements are given of the heat emitted by the planets, e.g., Mars, Jupiter, Venus, Saturn, etc., as the result of heating by solar radiation.

It is shown that the atmosphere of Mars is only dense enough to intercept a portion of the sun's rays so that the surface of the planet becomes appreciably heated and these emanations may be measured. On the other hand, Jupiter is so far away that its atmosphere is heated but very little by the sun. This atmosphere is so thick and dense that apparently the sun's heat can not penetrate to the surface of the planet, and even if the planet itself gives out heat, these rays are all trapped by the atmosphere.

4 New Cadmium-Gallium Lamp

The production of light sources from which pure monochromatic light of various wave lengths and great intensity may be obtained is from a practical view-point of great importance in the field of optics.

During the past month, the Bureau of Standards has constructed an enclosed quartz vacuum lamp using an alloy of gallium and zinc, similar in many respects to the cadmium-gallium lamp previously designed. The design of the new lamp has been so perfected that the lamp operates quite satisfactorily with very little flickering, giving several intense lines, one red, and several blue and green.

Preliminary experiments have been made in connection with the production of a thallium lamp, but the results so far have not been entirely satisfactory owing to the high temperature at which it is necessary to run the lamp to prevent the thallium from depositing on the walls of the light space, thus covering up the arc.

5 Clarification of Crude Saccharine Products by Means of Basic Lead Acetate

In connection with some of the researches in progress at the Bureau, an investigation has been conducted on the clarification of crude saccharine products in preparation for polariscopic analysis by means of basic lead acetate. The work includes a study of the effect of varying the basicity of basic lead acetate solutions upon the degree of clarification obtained.

A new method has been devised for determining the volume of the lead precipitate. This volume makes up a part of the total volume of the material to be polarized

and thus renders the concentration of the sugar a matter of uncertainty. In one method of clarification, dry lead acetate is used. The composition most favorable for this purpose is being studied.

6 Composition, Purification, and Certain Constants of Ammonia

Several years ago at the request of the refrigeration industries, the Bureau of Standards undertook an extensive investigation of the properties of anhydrous ammonia. Upon the results of this investigation will be based the compilation of accurate tables for engineers' use in designing and studying the operation of refrigerating machines.

All of the properties necessary for such a compilation have now been determined within the range of pressure and temperature ordinarily encountered in practice. The most refined physical measurements have little real value, however, unless assurance is given that the material used is of high purity. The necessary information on this point is contained in Scientific Paper No. 465, on the "Composition, Purification, and Certain Constants of Ammonia," which has just been issued.

Analyses of a number of standard American brands of commercial ammonia now upon the market indicate that they are more worthy of the designation "chemically pure" than many of the more common chemical reagents. Tests conducted at this Bureau showed that most commercial ammonias contain less than 0.1 per cent of impurities.

This paper can be purchased from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 10¢ a copy.

7 Relation Between Specific Gravity, Degrees Baumé, and the American Petroleum Institute Scale

The volumetric section of the Bureau of Standards has recently prepared a mimeographed circular known as Letter Circular 89 which contains conversion tables for petroleum oils. These tables give the relation between specific gravity, degrees Baumé, and degrees A.P.I. (American Petroleum Institute). A special hydrometer scale used in connection with petroleum has come into extensive use within the past few years, and there has been much confusion between it and the Baumé scale for light liquids. Originally all oil hydrometers were intended to be graduated in accordance with the relation

$$\text{Degrees Baumé} = \frac{140}{\text{Sp.Grav. } 60°/60°\text{F}} - 130$$

Through errors in the early standards of one manufacturer of hydrometers, many instruments made for the oil trade were graduated on a basis slightly different from the above formula and more nearly represented by replacing 140 and 130 in that formula by 141.5 and 131.5, respectively. These

instruments, although in error, came into very wide use and on account of the confusion resulting from the use of the two scales, both of which were commonly called "Baumé," it was agreed in December, 1921, by the American Petroleum Institute, the Bureau of Mines, and the Bureau of Standards that this scale, based on the modulus 141.5, should be recognized and approved for exclusive use in the oil industry in place of the regular Baumé scale for all liquids lighter than water, and that it should be known and designated as the American Petroleum Institute scale or A.P.I. scale.

It should be clearly understood that the A.P.I. scale, with modulus 141.5, is only for use in the petroleum oil industry, and that the regular U. S. Standard Baumé scale for liquids lighter than water, modulus 140 should be continued to be used for all other light liquids.

8 Performance of Railroad Track Scales

The Bureau of Standards has recently issued Letter Circular 88 "Performance of Railroad Track Scales." This is a statistical study based on 1000 tests made with equipment No. 3, special attention being given to the application of several systems of tolerances now in use by scale testing agencies as a criterion for grading weighing performance.

It is hoped that this publication, by revealing the effects of the application of the several tolerances now in use, will assist in procuring a uniform tolerance for railroad track scales.

This article, which has been prepared in mimeographed form, can be obtained from the weights and measures division of the Bureau of Standards.

9 Carburization of Steel

An investigation of the effect of the quality of steel upon its carburizing properties and particularly its hardening properties after carburization was suggested to the Bureau of Standards by commercial metallurgists as a problem of very considerable commercial importance. In order to obtain a wider expression of opinion on this matter, a circular letter was sent to approximately 100 prominent metallurgists. The replies which have been received all indicate the desirability of carrying out such an investigation and the practical importance which the results would have. As soon as the necessary material (abnormal steels) can be obtained, the work will be started.

10 Gases in Monel Metal

The Bureau has just completed determinations of oxygen and hydrogen in samples representing three phases of the deoxidation of monel metal. The samples were all from 50 lb. blocks cast during the progress of a regular heat. These samples represent (1) the metal at the time of tapping the furnace before the addition of any deoxidizers;

(2) the above metal after the addition of ferro manganese in the ladle, and (3) the above metal after the further addition of magnesium in the ladle, that is, after all additions have been made. Both oxygen and hydrogen in the metal decreased rapidly with the progress of the deoxidation. The finished metal, as represented by the last sample of this heat and by samples of completely deoxidized metal from two other heats, contains from 0.002 to 0.005% oxygen. All samples appear rather porous under a magnification of 100.

A sample of monel metal prepared as above, except that a portion of the deoxidation was carried out in the furnace rather than entirely in the ladle, showed no porosity, and no oxygen could be detected. A sample of monel metal from a Herault furnace heat, which had been completely deoxidized in the furnace, likewise was entirely sound and contained no oxygen. Thus of the five samples of finished monel metal examined, the three which were deoxidized by addition of ferro manganese and magnesium in the ladle were porous and contained from 0.002 to 0.005% oxygen, while the two which were deoxidized entirely or in part in the furnace were sound and contained no oxygen.

11 Solders for Aluminum

Circular No. 78 of the Bureau of Standards entitled, "Solders for Aluminum," has recently been revised. It will soon be available from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5¢ a copy.

Most of the metals commonly used in solders, except magnesium, are electro-positive to aluminum, so that any metals used in making a soldered joint of aluminum act electrolytically in the presence of moisture as positive galvanic poles accelerating the corrosion of the aluminum. Magnesium cannot be utilized advantageously even though it is electro-negative to aluminum because the metal disintegrates rapidly in the presence of moisture. Therefore, soldered joints of aluminum which are to be exposed to moisture should be protected against corrosion by paint or varnish. Various compositions of zinc-tin and zinc-tin-aluminum solders give the best results.

The tensile strength of a good aluminum solder is about 7000 lb. per sq. in., because those with higher tensile strength usually have such a high temperature of complete liquidation that they are unsuited for soldering purposes. As a rule, the strength of an aluminum soldered joint depends upon the type and workmanship.

12 Metallurgical Publications

The following articles dealing with metallurgical subjects have been published during the past month.

"The study of Steels in Engineering Structures" by G.K.Burgess, Proc. Am. Soc. Civ. Eng., March 1923, pp524-47;

"A Recording Chronograph for the Inverse Rate Method of Thermal Analysis" by H.J.French, Trans. Am. Soc. for

Steel Treating, March, 1923, p.640;
"The Structure and Related Properties of Metals" by H.S.Rawdon, Trans. Am. Soc. for Steel Treating; and
"The Microscopic Examination of Dirty Steel" by Samuel Epstein, Chem. & Met. Eng., March 14, 1923.

This last article is a short one emphasizing the need of very careful preparation of specimens in making examinations of this kind. Much more care is required than in the ordinary microscopic analysis in which the metal is etched.

13 Electrolysis Investigation, Galveston, Texas.

The Bureau of Standards has recently undertaken an extensive electrolysis investigation in the City of Galveston, Texas. This investigation is cooperative in character, all of the utilities in Galveston who were concerned in the electrolysis problem having arranged to participate in it and cooperate actively with the Bureau in making the tests. The primary object of the work is to secure additional data concerning the application of the earth current meter to electrolysis testing. It is expected that the results will demonstrate further the utility and necessity of employing this method and instrument where reliable information as to electrolysis conditions and a quantitative measure of the degree of hazard are required. The investigation is, therefore, mainly one of fundamental research, although it is expected that considerable detailed information regarding the local electrolysis conditions will be obtained, and a study of the effectiveness of existing mitigative measures will be made.

14 Lead Resistance in Current-Transformer Tests

In the accurate use of current transformers, such as are used for the measurement of large amounts of power supplied at high voltage, it is very essential that the transformers be tested when connected to a secondary circuit which is identical with or equivalent to the circuit with which they are used. The apparatus, by which such devices are tested in standardizing laboratories such as that of the Bureau of Standards, necessitates the introduction of a certain amount of resistance into the circuit. If the circuit with which the transformer is to be used contains a lead resistance of as much as one-tenth ohm, it is quite feasible to substitute the testing apparatus for these leads when the transformer is tested. In case, however, the leads used with the transformer have much less resistance, it becomes impracticable to make the calibration under precisely the same conditions as those under which the transformers are used. A brief article on this subject has been prepared by the Bureau and will appear shortly in the Electrical World. It calls attention to the above facts and urges users of current transformers to insert an additional resistance in the circuits of transformers which are to be submitted to a precise laboratory test. It is hoped that this article

will stimulate the use of such resistances and will simplify and render more accurate the work of precise testing both by the Bureau of Standards and by other standardizing laboratories.

15 Polarization of Iron and Lead Structures

Some experimental research work was carried out during the past month at the suggestion of a prominent engineer to determine whether the polarization produced on iron and lead structures buried in the ground by the presence of stray currents during the day or at certain times persists for a long enough period to be an important factor in electrolysis testing.

This investigation was completed and the results reported to the engineer who raised the question. It appears that in the case of two lead pipes or a lead-iron combination in which the lead is positive the polarization produced by a preliminary impressed voltage may leave a residual value of one-tenth of the impressed voltage which may persist for a period of several years. However, the conclusion is that it will not be a very important factor in electrolysis testing.

16 Auxiliary Condensers and Loading Coil Used with Simple Homemade Radio Receiving Outfits

A fourth circular in the series of descriptions of very simple radio receiving outfits prepared by the Bureau of Standards has just been issued. This is Circular No. 137 entitled, "Auxiliary Condensers and Loading Coil Used with Simple Homemade Radio Receiving Outfits," and can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5¢ a copy.

Circulars 120 and 121 described a single-circuit receiving set and a two-circuit set, respectively. The operation of either set can be improved by the use of a very simple and cheap condenser connected across the telephone receivers and a similar one connected in series with the antenna. Longer waves can be received by the use of a very simple type of loading coil, which is particularly useful in connection with the single-circuit receiving set.

The auxiliary condenser, which is used in series with the antenna and the loading coil, may also be used when the crystal detector is replaced by an electron tube detector unit (as described in Circular No. 133) or when an amplifier (to be described in a later circular) is added to the receiving set.

The condenser used in series with the antenna makes it convenient to tune to wave lengths less than 300 meters. The condenser used across the telephone receivers increases the intensity of signals which are received from some radio stations. The loading coil enables the equipment to respond to wave lengths above 600 meters, up to about 3000 meters. Time signals from high power stations can thus be received. The use of the loading coil also increases the receiving distance of the equipment, because many of the higher power stations use longer waves.

17 Second National Radio Conference

The bill for the regulation of radio which was before the last Congress failed to pass and for this reason the Secretary of Commerce called a second national conference to determine what could be done through administrative measures to relieve radio interference. Nineteen persons were invited to participate representing the various phases of governmental, commercial, and private interests in radio. The Bureau of Standards had two representatives in the conference and participated in the preparation of agenda and the general conduct of the conference which lasted from March 20 to 24 inclusive.

One of the principal recommendations of the conference was the provision of a wide band of wave lengths from 222 to 545 meters for broadcasting exclusively except for some ship traffic on two wave lengths. The higher power stations are to have the wave length band from 288 to 545 meters, each wave length within this band being assigned without duplication to 50 localities throughout the country. The shorter wave length range is to be used for the lower power broadcasting stations. It is believed that this plan will result in much more satisfactory service to the public. Amateur transmitting stations are to have the use of wave lengths from 150 to 200 meters, except in the case of special amateur continuous wave stations which are to have from 200 to 222 meters. Provision is made for marine radio traffic in the range from 600 to 2500 meters including a provision for marine telephony on certain wave bands between 674 and 1277 meters.

The conference expressed its unanimous opinion that the Secretary of Commerce in licensing stations has authority under the present law to regulate hours, wave lengths, and power of the station, and to revoke or withhold licenses when such action is necessary to prevent interference detrimental to the public good.

18 The Separation of Iron and Aluminum from Manganese and Certain Other Elements

A paper on this subject by G.E.F.Lundell and H.B.Knowles was published in the Journal of the American Chemical Society, Vol. 45, page 676. This paper may be summarized as follows:

1. Moderate amounts of iron and aluminum can be separated from manganese and nickel as satisfactorily by precipitation with ammonia as by the basic acetate or barium carbonate methods. The only requirement is the procedure recommended by Blum for the complete precipitation of aluminum, namely, presence of ammonium chloride, very low alkalinity (pH = 6.5 to 7.5, as indicated by methyl red or other suitable indicator), and only 1 to 2 minutes' boiling of the alkaline solution.

2. Phosphorus and vanadium interfere but slightly in the separation when iron or aluminum is preponderant. When the reverse holds, they form insoluble compounds with

manganese and interfere not only in separations by ammonia but also in the methods using basic acetate or barium carbonate.

3. Under the above conditions, the separation of iron and aluminum from cobalt, copper, and zinc is incomplete. A large excess of ammonium chloride improves the separation.

4. An excess of both ammonia and ammonium chloride gives a better separation from copper and zinc. Under these conditions, however, the precipitation of aluminum is incomplete and the separation from manganese, nickel, and cobalt is less satisfactory.

19 Recent Technologic Paper on Shellac

Technologic Paper No. 232 on Shellac, which has just been published, can be obtained at 5¢ a copy from the Superintendent of Documents, Government Printing Office, Washington, D. C.

A description is given of the source, manufacture, uses, and common methods of testing shellac. It is shown that the generally accepted iodine value method for determining rosin in flake shellac may be subject to very large errors, and this method can not be applied to cut shellac. The amount of material soluble in a light petroleum distillate and the acid number of this material are shown to be quite constant for pure shellac, and a method of determining adulteration both by rosin and other substances which can be as easily applied to cut shellac as to flake shellac has been developed. Suggested specifications for pure orange flake shellac and orange shellac varnish are given.

20 Acid-Proof Coatings for Concrete Surfaces

Letter Circular 42 of the mimeographed series of the Bureau of Standards has lately been revised and is now ready for distribution. This circular deals with acid-proof coatings for concrete surfaces and the revised edition contains many corrections and much new material, among which are specifications covering materials for acid-proof mastics and methods for their application as well as a detailed description of acid-proof asphalt flooring composition for cold application.

21 Weathering Tests of Stone

Weathering tests, consisting of freezing and thawing of the specimens until disintegration occurs, are in progress at the Bureau of Standards on 22 samples of limestone and 23 of sandstone. Some of the best limestones have withstood 800 freezings without showing any appreciable amount of decay, while the poorer grades of this material were disintegrated by 100 freezings. Tests on the sandstones have only recently been started, and so far the samples have shown no great amount of decay.

A number of limestone and sandstone specimens are also being tested by soaking in a 15% solution of sodium chloride and drying afterwards to obtain a crystallization

of the salt in the pores of the stone. This produces an action similar to that of frost but more severe. It has been found that limestones which stood up under several hundred of the freezings were disintegrated by less than 100 crystallizations in the salt test. However, the actual disintegration seems to be similar to that produced by the action of frost, and hence it is believed that there is a possibility of using this method as an accelerated weathering test.

22 Tests of New Design of Large Hawsers

Tensile tests were made during the month on 21 samples of very large hawsers. The purpose of these tests was to determine the comparative strength of a new type of construction for manila rope as compared with the standard method of construction. In the new type the inner yarns of the strands are untwisted. The strands are made up of several outer layers of twisted yarns binding this inner compact mass of fibers; these strands being twisted in the usual manner to form the rope. The tests showed that in all cases the new type of construction increases the strength of the rope.

23 Tests of Welded Rail Joints

Two welded 7-inch rail joints were recently tested for the Welded Rail Joint Committee of the American Electric Railway Association and the American Bureau of Welding. One of the joints, a thermit weld, failed at an ultimate load of 600 000 pounds. The other joint, of the welded fish plate type, failed at about 200 000 pounds. Transverse tests were also made on similar welds. These tests illustrate the methods which will be used in testing several hundred joints representing the types at present in use in this country.

24 Elevator Safety Code

There is great diversity in the requirements of various states with regard to elevator construction and operation, although the important advantages which might be gained by uniformity of practice are generally recognized.

The Elevator Safety Code, formulated by the American Society of Mechanical Engineers, at present constitutes the best available basis for such uniform requirements. This code is now used in the States of Utah and Oklahoma, and is the basis of the new code for New York state. It is also used by the City of Baltimore.

It has been recognized, however, that some revision of the rules is desirable, particularly in order to provide ones which shall apply to existing installations as these can not always be brought into conformity with the requirements of new construction. As mentioned in paragraph 25 of last month's Bulletin, such a revision of the Code is being undertaken by a sectional committee working under the rules and procedure of the American Engineering Standards

Committee and under the joint sponsorship of the American Society of Mechanical Engineers, the American Institute of Architects, and the Bureau of Standards.

The District of Columbia has recently taken up the revision of its elevator requirements and a set of proposed rules has been drafted. Since it is very desirable to have these conform to the proposed new version of the American Society of Mechanical Engineers' code, a joint meeting of the elevator safety code committee with the local officials and others interested in the matter was held at the Bureau of Standards on March 12. This meeting was attended by representatives of the local chapters of the American Institute of Electrical Engineers and the American Society of Mechanical Engineers as well as by representatives of the District government and members of the sectional committee.

As a result of the meeting, the District officials agreed to consider the present American Society of Mechanical Engineers' Code as applying to new installations and asked that a code for existing installations be prepared and submitted for their consideration. This work is now being undertaken by subcommittees of the above-mentioned sectional committee.

25 Standardization of Milk Bottles

A third conference of the committee on the standardization of milk bottles was held at the Bureau of Standards on March 6. A rather extended discussion of the filling point led to no conclusion, as the Milk Dealers' Association's vote was in favor of filling to the cap seat, and their representative could take no further action.

The Bureau believes that the milk dealers can be convinced of the wisdom of its recommendations if the case is put before them in a group, and it is hoped that this can be done at their next convention in September.

A uniform method of marking was agreed upon, and it was decided that the Bureau ought to proceed to secure agreement among the various states concerning indicating marks and a uniform method of showing other desired information.

Resolutions were also passed recommending the use of one cap size and a limited number of bottle heights.

26 Specifications for Plate and Window Glass

The Plate Glass Manufacturers' Association and one of the large producers of window glass have accepted the last tentative specifications provided certain changes are made. As the changes proposed will undoubtedly result in an improvement of the specifications, they should prove acceptable to the other members of the committee. A copy of the last tentative form, together with the suggested changes, has been sent out to all committee members for a vote, and the Bureau hopes to secure a unanimous vote on this specification at an early date.

27 The Tensile Strength of Paper

There are a number of devices for determining the tensile or breaking strength of paper, but the procedure in carrying out the test has not been standardized, thus all sorts of combinations of width and length of the test specimen, rate of applying the load, and time during which the specimen is under stress, are in use.

A study of these various factors has been completed by the Bureau of Standards using a number of different types of paper, the study being made with a 50 kg Schopper tensile tester hydraulically operated. An examination of these data indicates that there is considerable difference in the amount of stretch when the factors are varied, but that when only the strength is to be considered, the length of the specimen, within limits, is of negligible importance, while the strength is almost proportional to the width.

28 The Mullen Tester for Measuring the Quality of Paper

What is known as the Mullen tester is used almost universally in this country for determining the bursting strength of paper, and on this factor is based to a large extent the measure of the quality of the paper. It often happens, however, that a sheet may be so made or so sized as to have a very high bursting strength and yet show up very poorly in a tearing or folding test.

The Bureau of Standards is working on a supplementary test employing two steel rollers which produce a crease in the paper under controlled conditions of pressure and time. The bursting strength is determined before and after such folding. The loss of strength under these conditions is an excellent indication of the brittleness of the paper. The method, however, must still be standardized.

A report on this subject will be published in the near future.

29 Variations in Bursting and Tensile Strengths of Paper with Different Humidities

The study of the curves of brusting and tensile tests of paper at different humidities indicates a striking similarity in the form and magnitude of the variations. Since it was believed that the data from these tests indicated similar properties of paper, a study was recently made by the Bureau of Standards of the relation between the two test methods. A special device was attached to a Mullen tester by means of which the deflection of the diaphragm was determined and from this the stretch of the paper could be calculated. Tests were made on similar specimens by means of the Schopper tensile tester, and the data arranged to indicate the possible relations

$$\frac{\text{breaking strength}}{\text{elongation}} = \frac{\text{bursting strength}}{\text{elongation}}$$

Although only a limited amount of data was obtained on account of the time available, the results indicate that

the above relation is valid, and it may come into use as a means of calibrating the Mullen tester.

30 Standard Boxes for Hosiery

Nearly all the work in connection with the development of standard boxes for packing hosiery has been completed resulting in the reduction of approximately 300 different sizes to about 55 standards. These standards have been made up in 10 sets, and actual packings will be made at the Bureau. After this check determination, the project can be considered complete, and it is expected that it will result in the saving of a very large amount of money to the hosiery industry. In fact, the secretary of the National Association of Hosiery and Underwear Manufacturers has stated that the saving will probably amount to $25,000,000.

31 Tentative Standard Test Methods and Percentages of Oil and Moisture in Hair Press Cloth

The press cloth used in the presses of the oil extraction industries requires great strength and resiliency, necessitating the use of hair to a large extent. Since purchases are ordinarily made on a weight basis, the various percentages of other ingredients are of primary importance.

At the request of and in cooperation with the Interstate Cottonseed Crushers' Association, the Bureau of Standards has made a study of the percentages of oils and moisture in various commercial press cloths. This investigation is described in Technologic Paper No. 231 of the Bureau of Standards, for sale by the Superintendent of Documents, Government Printing Office, Washington, D. C., at 5¢ a copy.

The results of this investigation warrant the selection of the following percentages as standards for this material: Moisture, 11%; oil, 5%; water-soluble, 2 1/2%.

32 Leather Produced from Degreased Hog and Sheep Skins

The investigational work on the quality of leather produced from degreased hog and sheep skins has been completed. In general, the results show that the degreasing process is very efficient, practically all of the grease being removed without apparent damage to the elements needed for making leather. Leather made from the degreased skins is superior to that made from the natural skins, and the time occupied in tanning is reduced with more effective results. Leather made from degreased hogskins is equal in physical properties to calf leather, while leather made from degreased sheepskins appears to have sufficient firmness and an improved appearance which makes it suitable for upper leather in some types of shoes instead of goat leather.

It is believed that by degreasing sheepskins and hogskins before tanning, leather can be produced which can be brought into general use for shoe uppers and as far as

the quality of the leather is concerned, it appears logical for packers to utilize hogskins for leather purposes.

No published report is available on this work at the present time, but one will be issued as soon as possible and the notice of it will appear in the Bulletin.

PUBLICATIONS OF THE BUREAU OF STANDARDS RELEASED DURING MARCH.

Technologic Paper

T 228 Lathe Breakdown Tests of some Modern High-Speed Tool Steels. H.J.French and Jerome Strauss 15¢

Circular

C 98 United States Government Specification for Volatile Mineral Spirits for Thinning Paints. (2nd edition) 5¢

These publications can be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at the prices given above.

Respectfully,

F. C. Brown

Acting Director

HGB